Supplimental Material

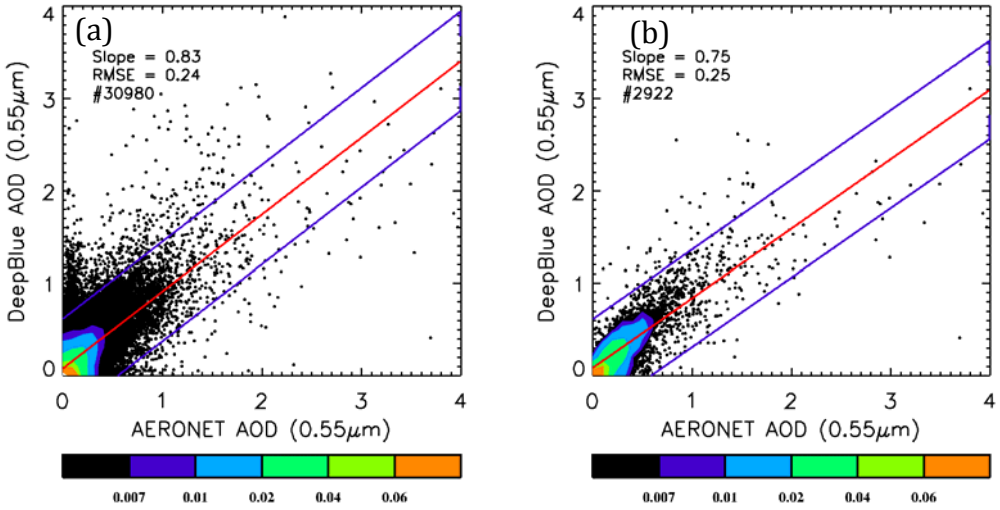

Figure 1. Comparisons between Terra DB and AERONET 2002-2009 for diagnostic purpose for **a.** all data, **b.** data with very good QA quality globally. The red line is the linear fit line and the blue lines are the 95% confident interval lines. The color contour showed the percentage data density.

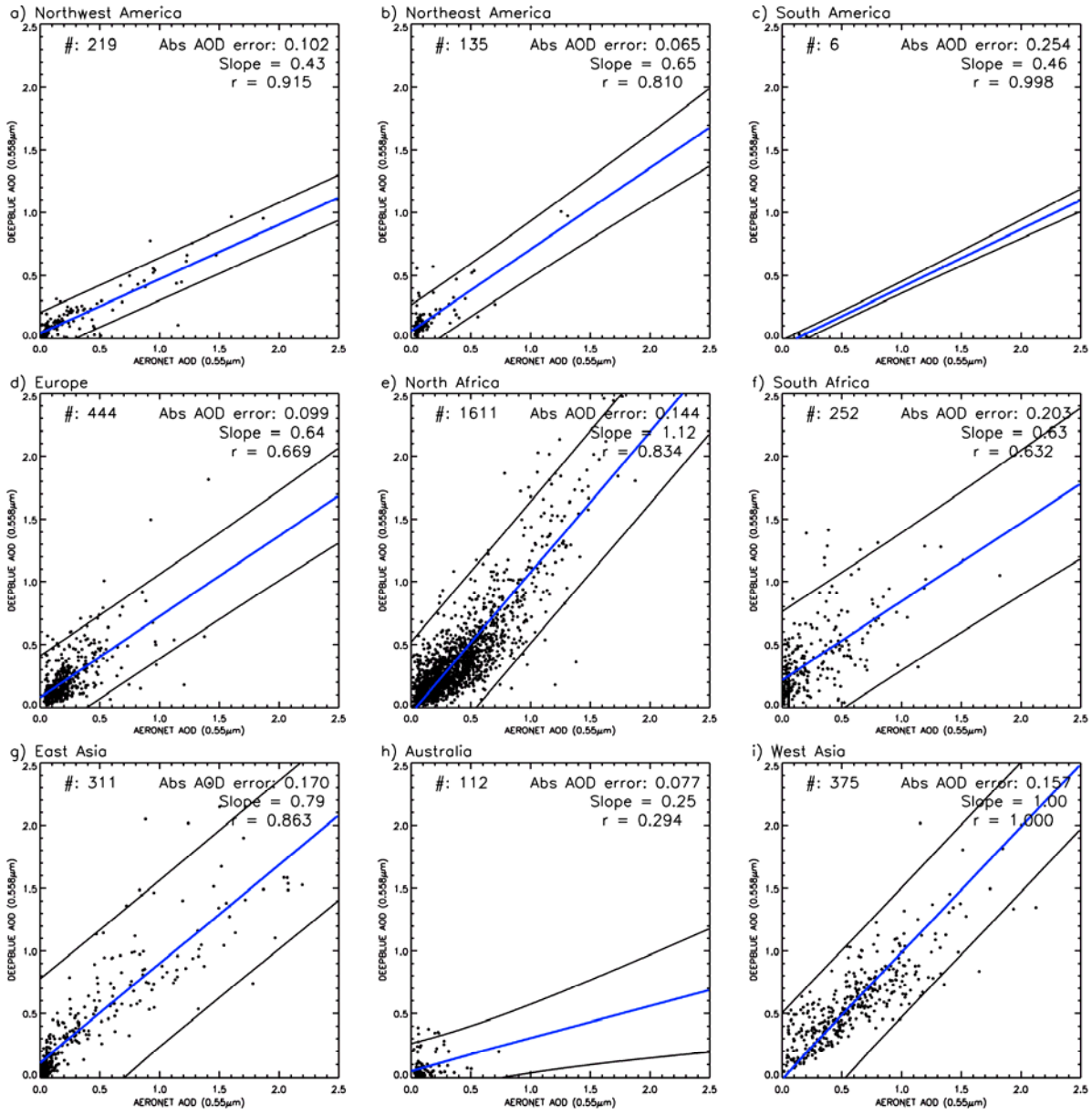

Figure 2. Regional comparisons between Terra DB AOD and AERONET AOD 2002-2009 for **a.** Northwest America, **b.** Northeast America, **c.** South America, **d.** Europe, **e.** North Africa, **f.** South Africa, **g.** East Asia, **h.** Australia, and **i.** West Asia. The blue line is the linear fit line and the black line is the 95% confident interval line.

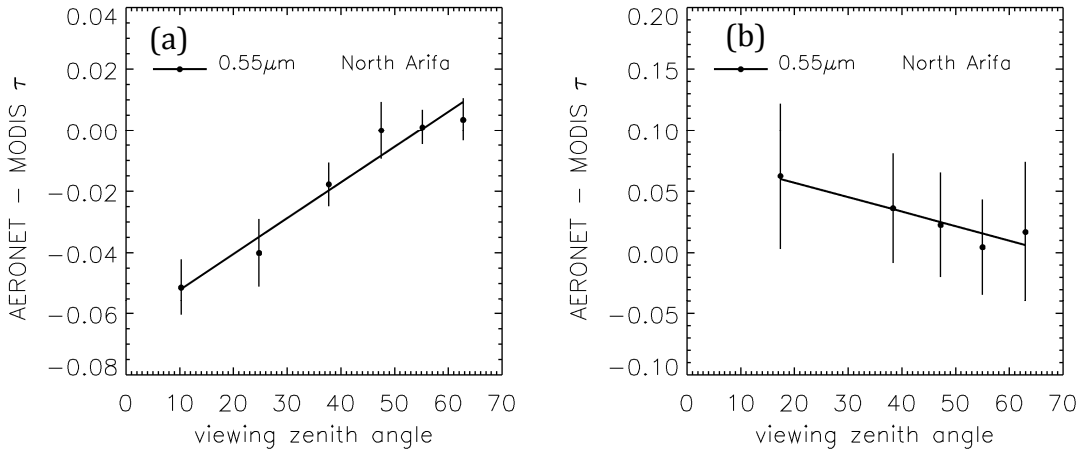

Figure 3. The differences in AOD between Terra AERONET and DB as a function of viewing angle over North Africa for **a.** total AOD without QA filter, and **b.** AOD with "Very Good" QA. Data were averaged for every 10 degrees viewing zenith angle and one standard deviation bars were shown.

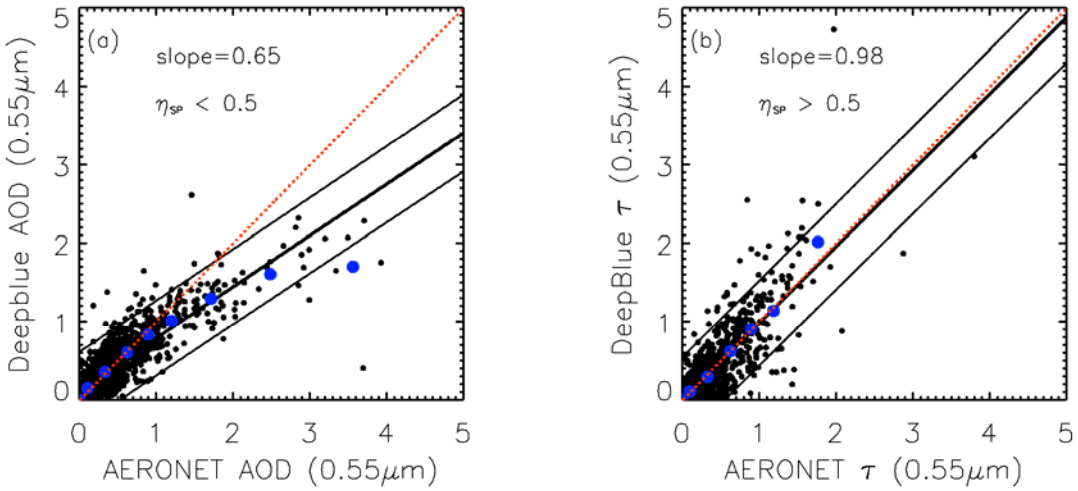

Figure 4. Comparisons between Terra DB AOD and AERONET AOD globally during 2002-2009 under cloud free conditions for **a.** fine mode fraction smaller than 0.5 and **b.** fine mode fraction greater than 0.5. The blue dots represent the averaged DB AOD for each AERONET AOD bins. The thicker black line is the linear fit line and the thin black line is the 95% confident interval. The red dash line is the 1 to 1 line.

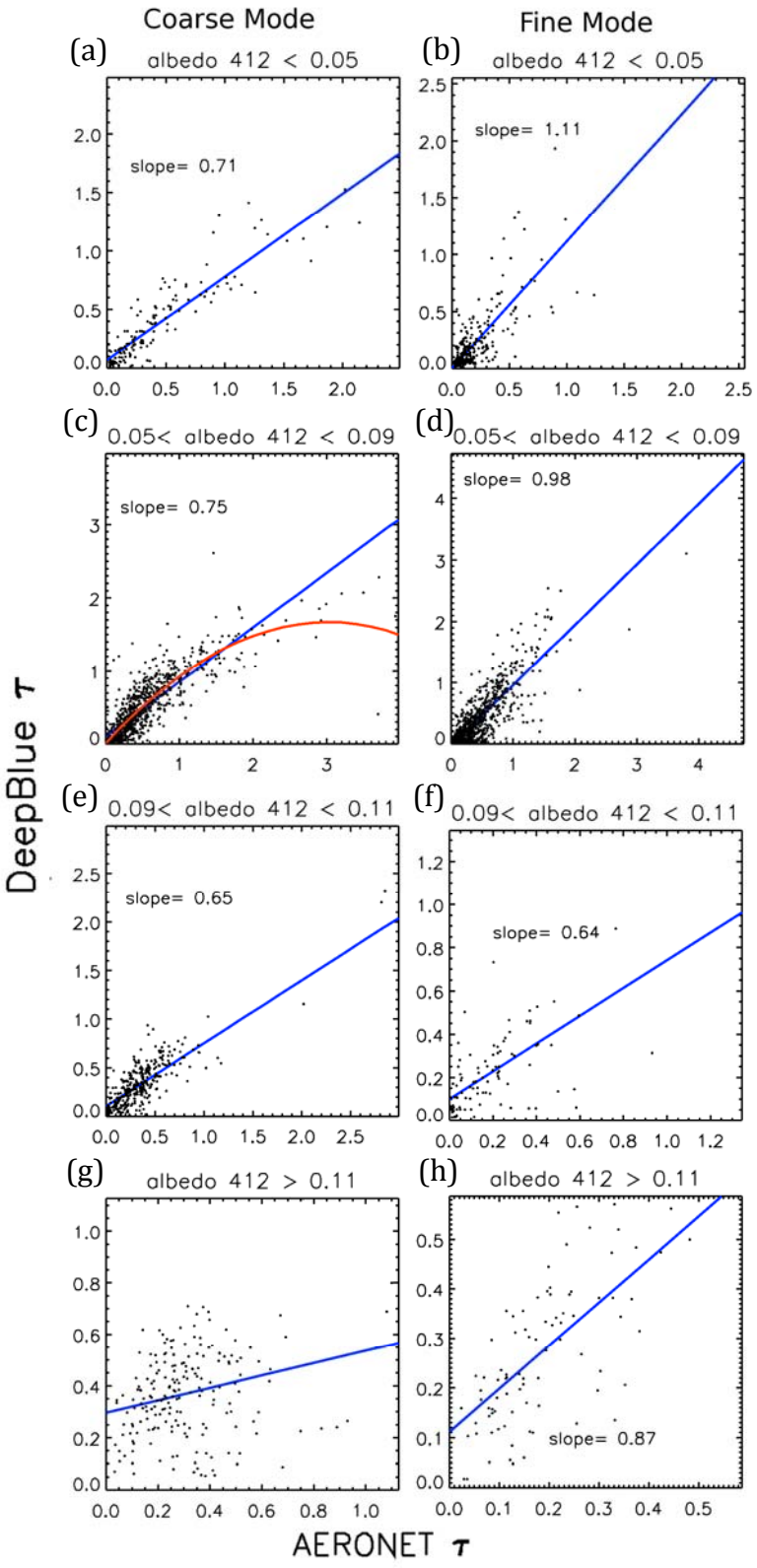
Coarse Mode
Fine Mode
(a)
albedo 412 < 0.05
slope= 0.71
(b)
albedo 412 < 0.05
slope= 1.11
(c)
0.05< albedo 412 < 0.09
slope= 0.75
(d)
0.05< albedo 412 < 0.09
slope= 0.98
(e)
0.09< albedo 412 < 0.11
slope= 0.65
(f)
0.09< albedo 412 < 0.11
slope= 0.64
(g)
albedo 412 > 0.11
(h)
albedo 412 > 0.11
slope= 0.87
DeepBlue τ
AERONET τ

Figure 5. Comparisons between coarse and fine modeTerra DB AOD and AERONET AOD at 0.55 μm globally 2002-2009 with albedo at 0.412 μm**a.** and **b.** smaller than 0.5, **c.** and **d.** ranged between 0.5 and 0.8, **e.** and **f.** ranged between 0.8 and 0.11, and **g.** and **h.** greater than 0.11. The left panels show the coarse mode with fine mode fraction smaller than 0.5, the right panels show the fine mode fine mode fraction greater than 0.5. The blue line is the linear regression line and the red line is the polynomial regression line.

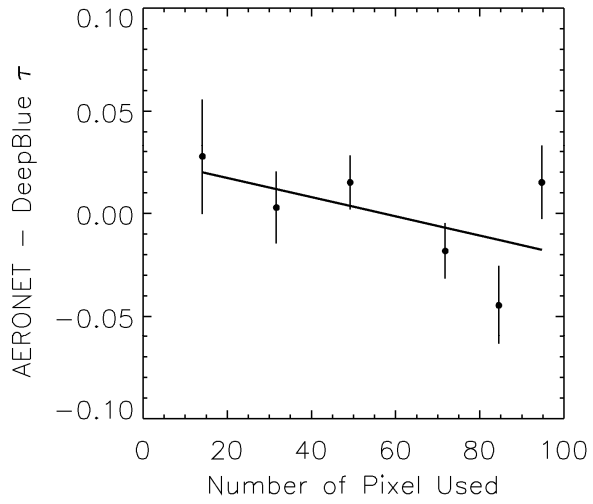

Figure 6. AOD bias ($\Delta\tau_{A\text{-}M}$, AERONET minus DB AOD) as a function of number of pixel used in retrieving. The one standard deviation bar was shown.

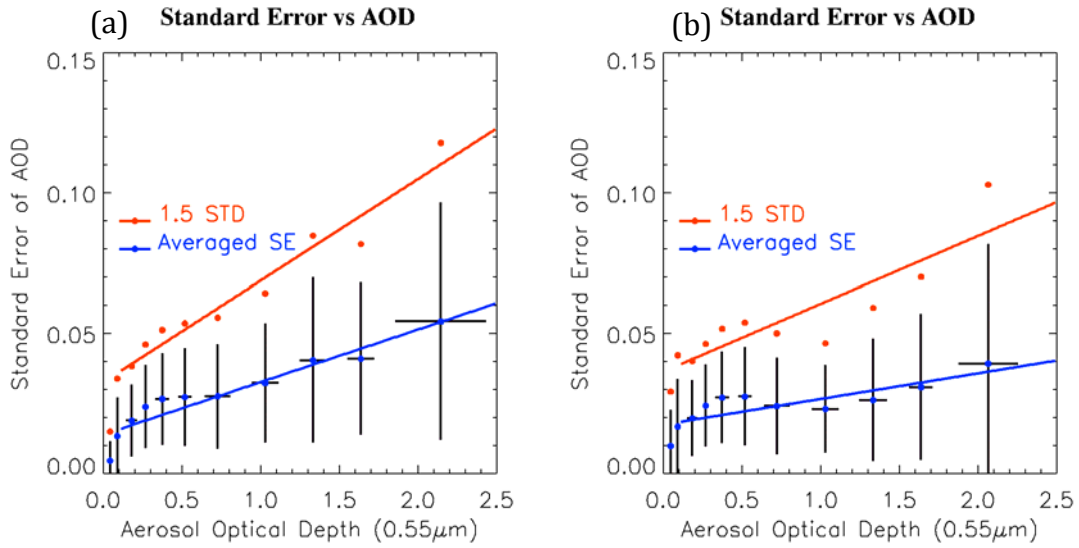

Figure 7. Scatter plot of standard error threshold of AOD versus AOD at 0.55 μm for Terra DB. Dots represent the averaged Standard Error (blue) of AOD and the 1.5 standard deviation (red) for every 0.05 of AOD when AOD<0.5 and 0.3 of AOD when AOD>0.5. The blue lines and red lines show the linear fit of corresponding dots. **a.**for DB AOD globally. **b.**for DB AOD over North Africa.

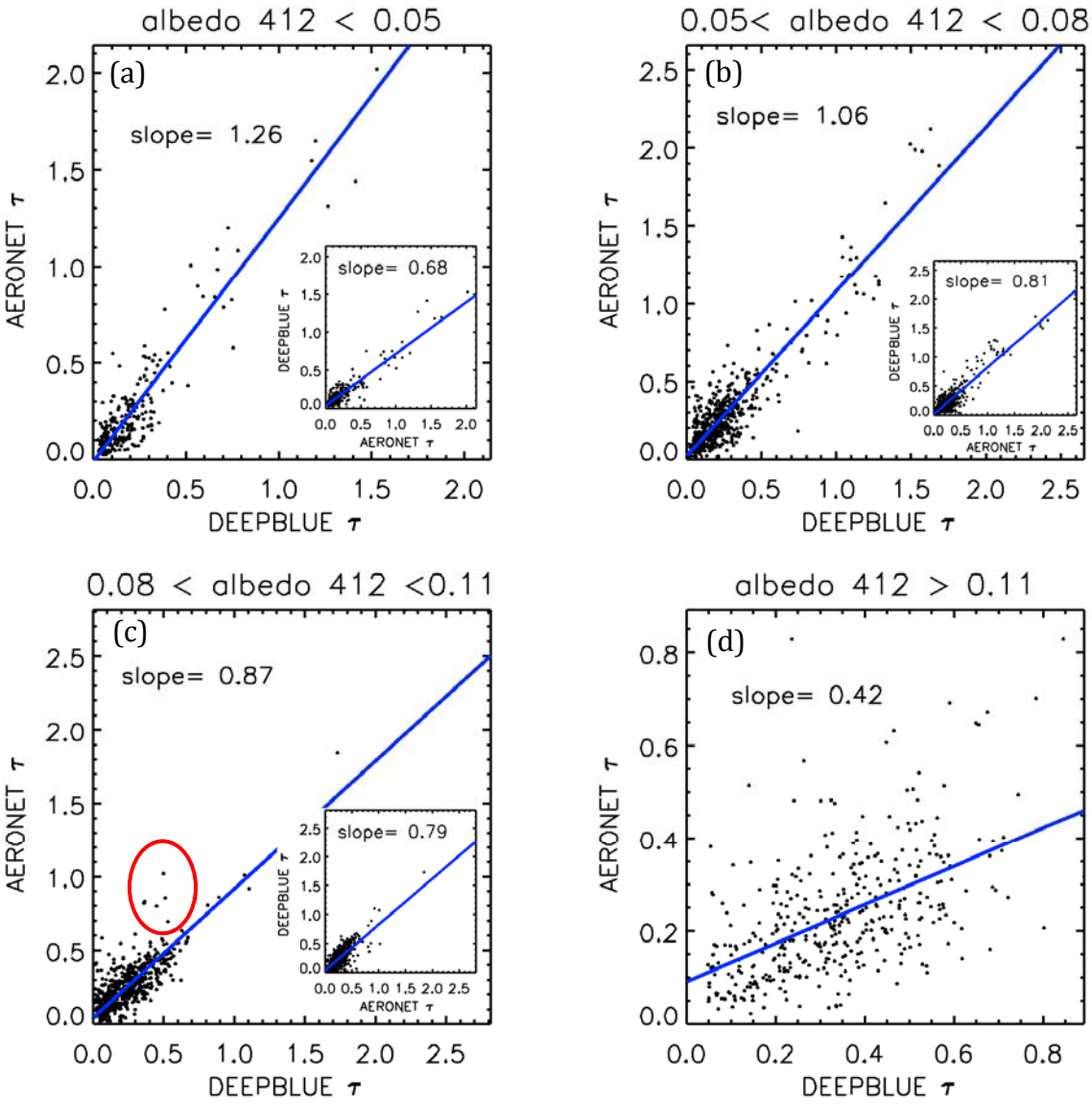

Figure 8. Comparisons betweenTerra DB and AERONET over North Africa 2002-2009 with albedo at 0.412 μm for mixed aerosol type, **a.** smaller than 0.5, **b.** ranged between 0.5 and 0.8, **c.** ranged between 0.8 and 0.11, and **d.** greater than 0.11. The blue line is the polynomial or linear fit line..

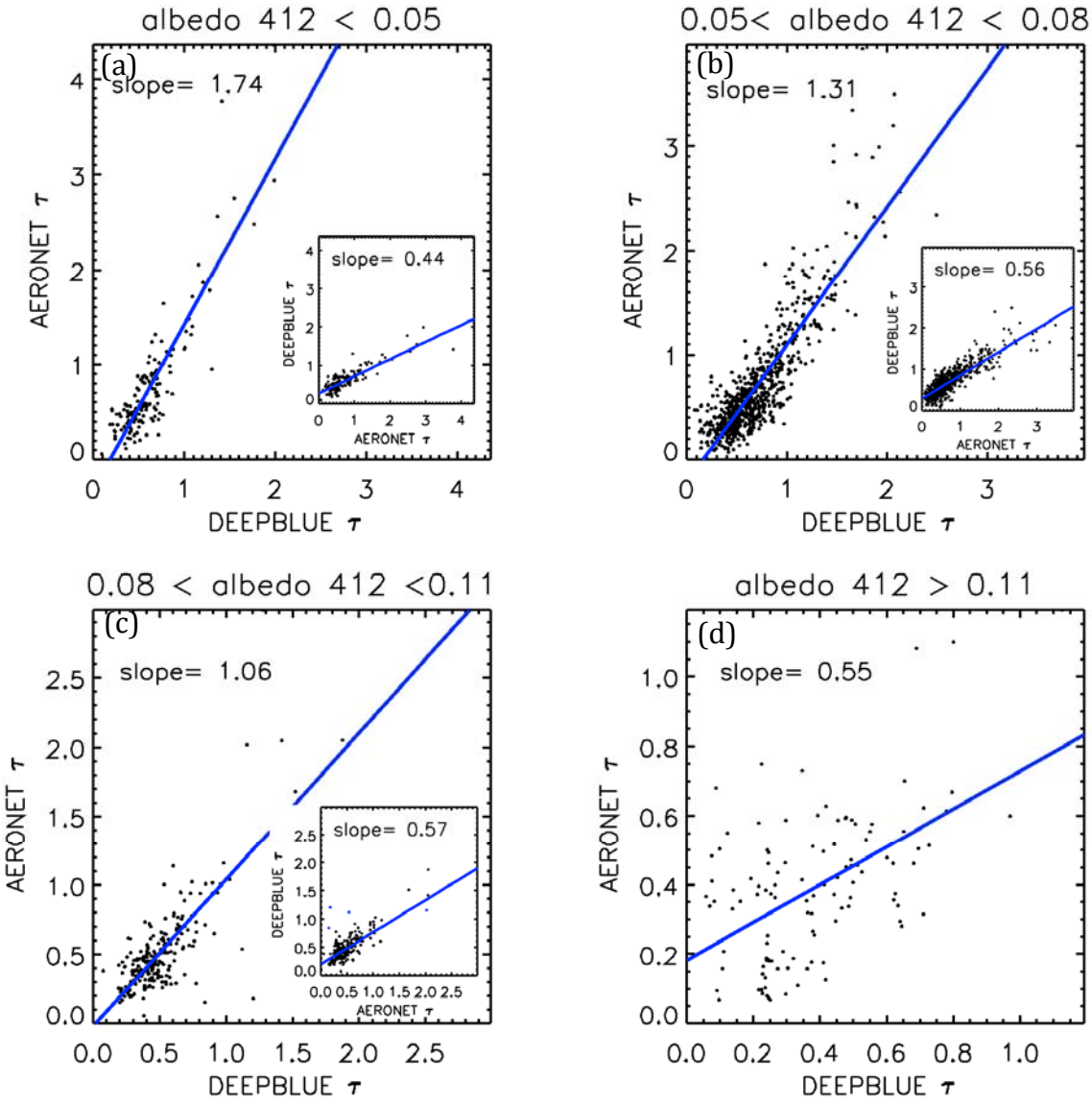

Figure 9. Similar to Fig. 8 but for dust type aerosol over North Africa only.

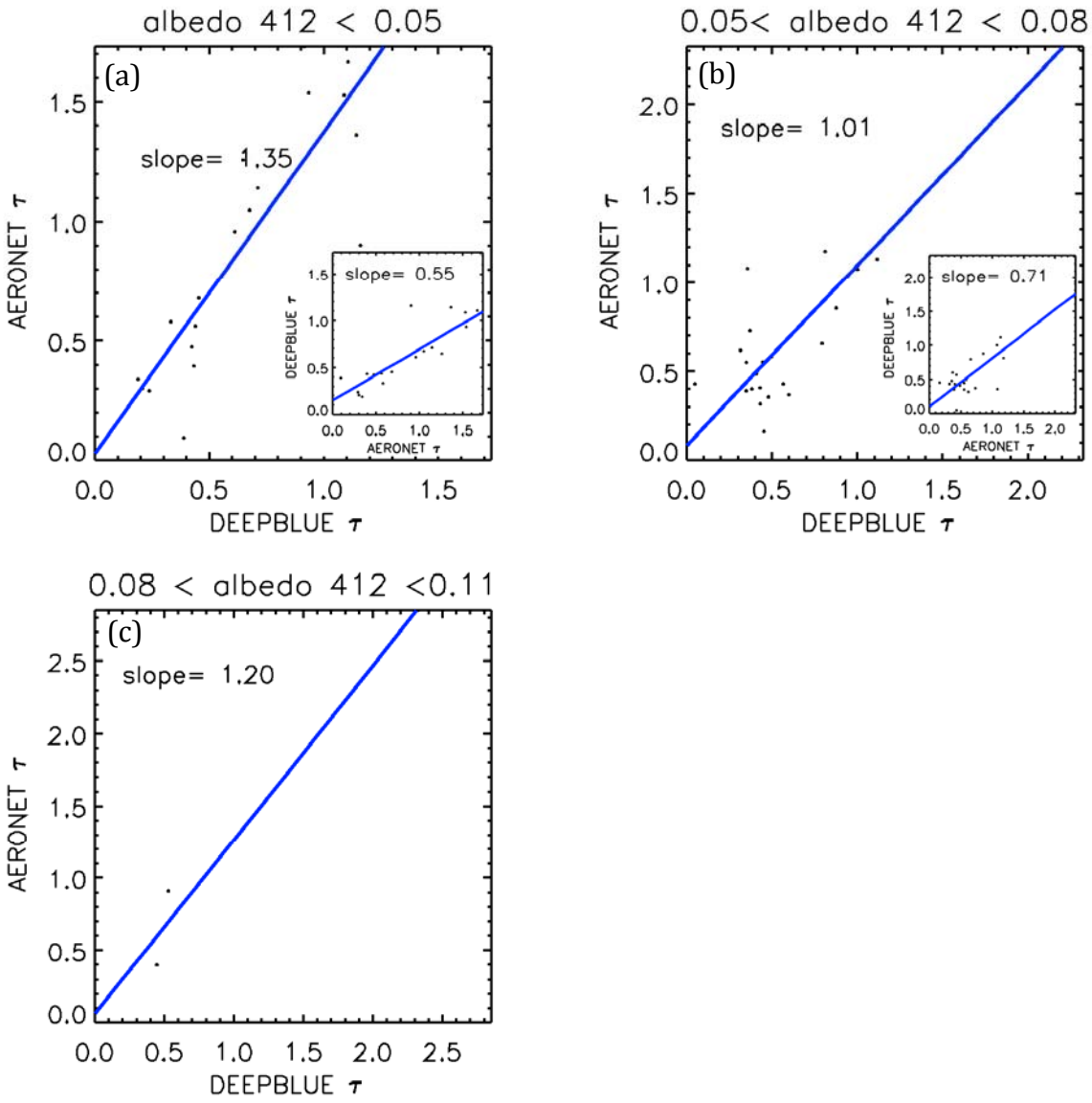

Figure 10. Similar to Fig. 8 but for smoke type aerosol over North Africa only.